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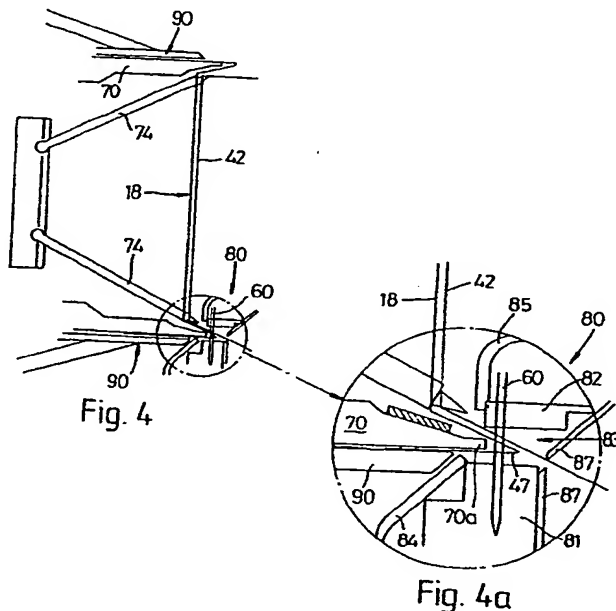
(58) Field of search

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INT CL⁵ A41B 9/02 9/04 9/08 11/14, A41D 27/24

(54) Nether garment

(57) A nether garment, e.g. breeches, briefs or panti-hose, comprises a body having a pair of leg openings defining therebetween a crotch region, and a crotch insert comprising at least one layer of material is secured to the body so as to overlie at least a portion of said crotch region. The crotch region 18 is stretched across the end of a support tube 70 by retreating the clamps 90 axially along the tube. The crotch insert 42, preferably in a stretched condition, is presented to overlie the crotch region and is located therewith on pins 74 which thereafter are moved radially outwardly to anchor the crotch region and insert to the tube in readiness for seaming. However, before seaming, the clamped portion of the crotch region is advanced slightly along the tube so as to create a slight fold 47. The tube is then presented to the sewing head for securing the periphery of the insert via stitching which passes through the insert and both pieces of the fold (Fig. 5a). The stitching is such, e.g. loosely formed, so that on removal of the garment from the tube, the folded seam may flatten out when the crotch region is stretched (Fig. 5b).



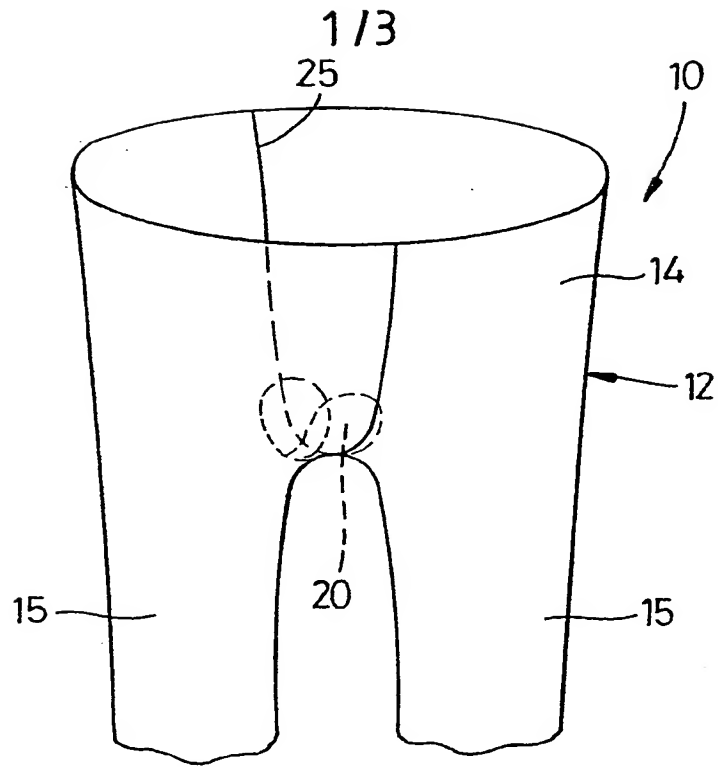


Fig. 1

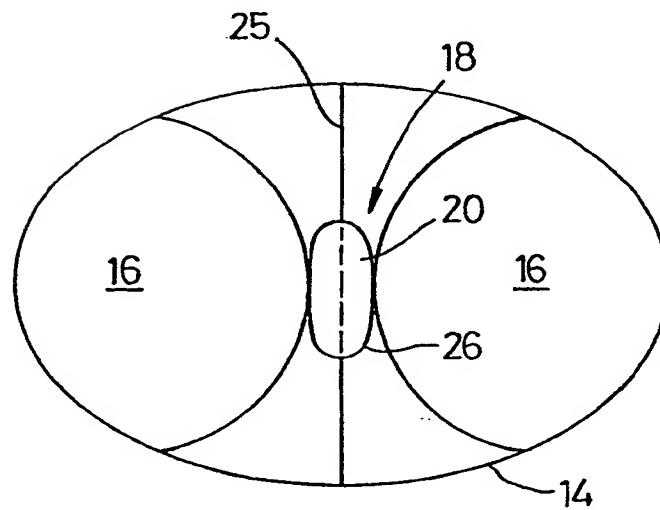
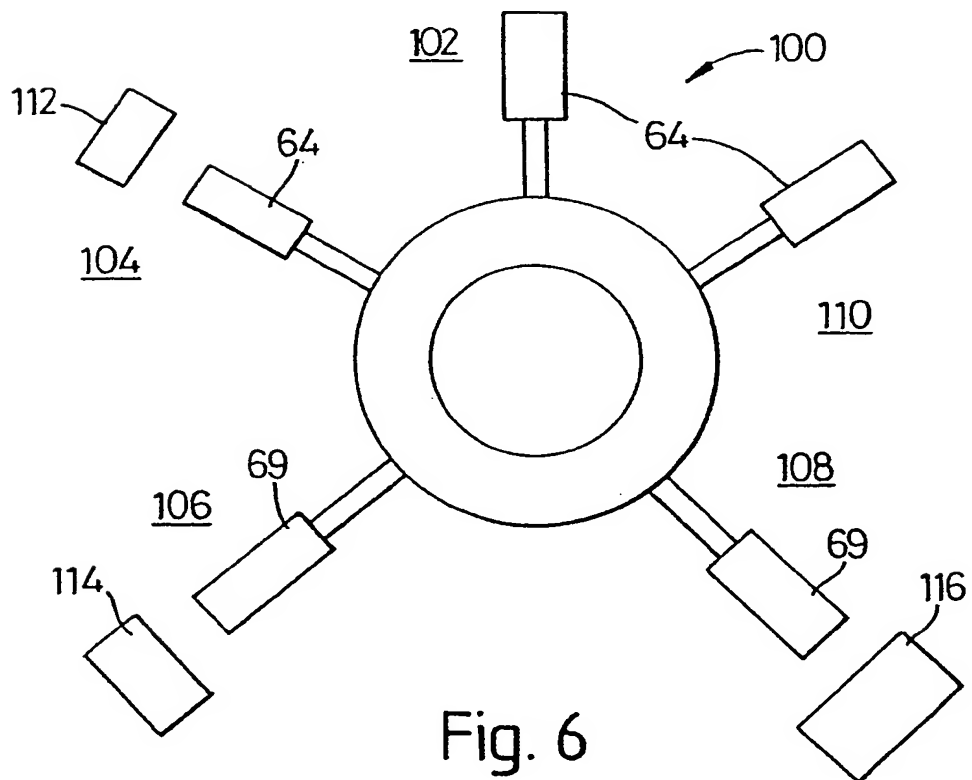
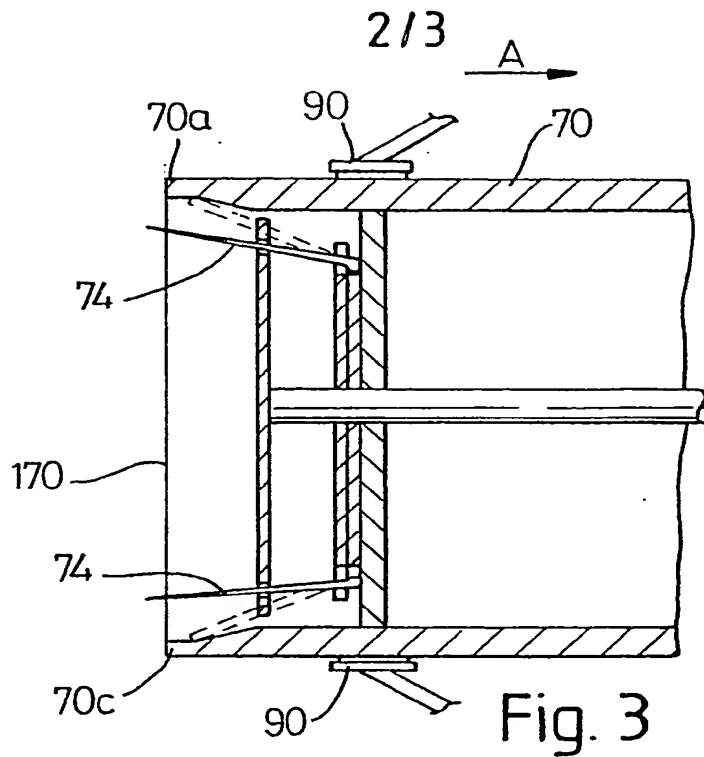


Fig. 2



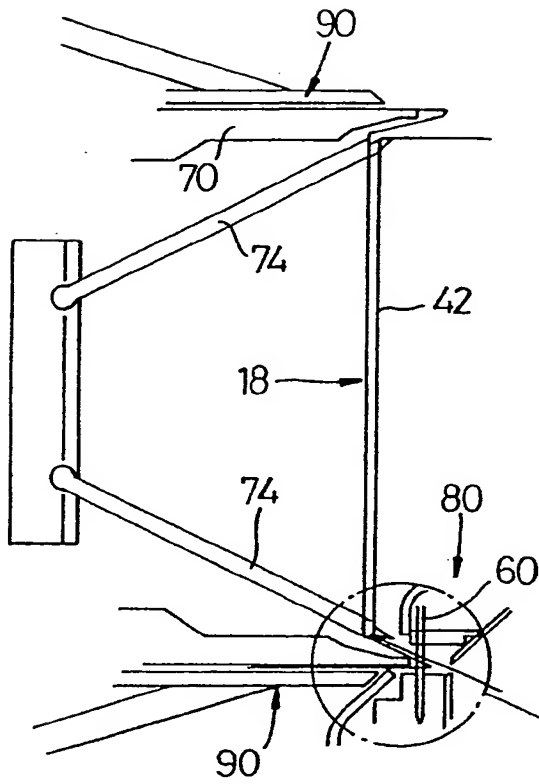


Fig. 4

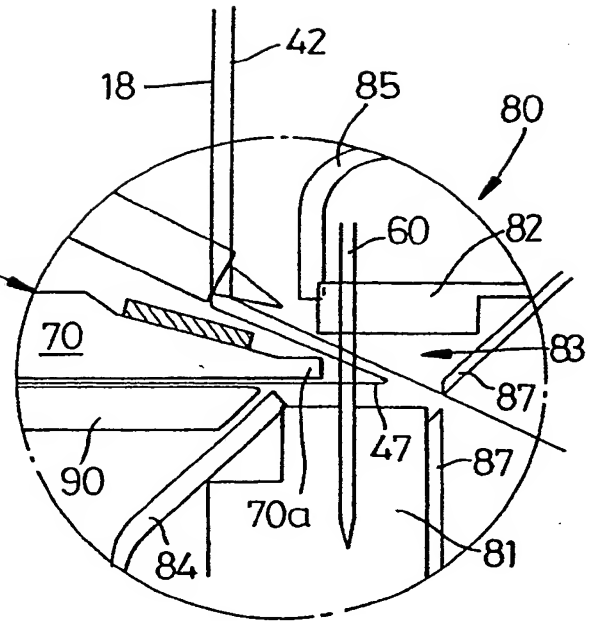


Fig. 4a

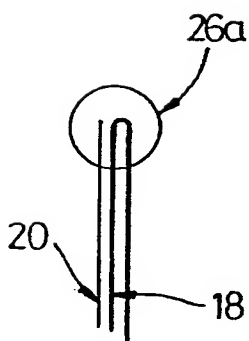


Fig. 5a

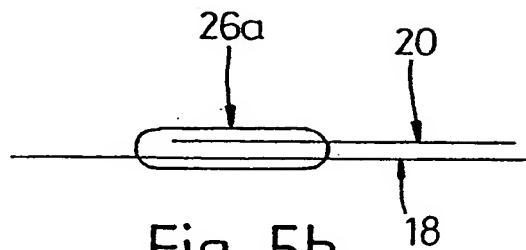


Fig. 5b

The present invention relates to nether garments, in particular pantihose.

It is common practice to provide crotch inserts in pantihose since such inserts can provide advantageous
5 benefits. For example, pantihose are normally knitted from polyamide or polyester yarns and these tend to be hydrophobic in nature. Accordingly providing a crotch insert made from a hydrophylic yarn such as cotton is desirable as it provides moisture absorbency and is also
10 regarded as more hygienic.

In addition, for pantihose made from a pair of tubes which are seamed together to define a U-seam, the provision of a crotch insert removes the U-seam portion in the region of the crotch and this can remove potential irritation and
15 provide a more comfortable fit.

However the provision of a crotch insert is conventionally achieved by providing an opening in the crotch region and filling the opening with a gusset piece. In order to provide adequate anchorage of the gusset piece
20 to the fabric of the pantihose a tight seam having a relatively high density of stitches per unit length is needed. This is particularly so for pantihose wherein the opening is created by cutting of the fabric of the pantihose since it is necessary for the seam to also anchor
25 the cut loops of the fabric to prevent running.

This type of seam tends to be relatively stiff, bulky and stands proud of the interior face of the pantihose fabric. Accordingly this type of seam can cause irritation to the wearer and thereby create discomfort.

It is known from UK patent 1268618 to provide pantihose in which an overlying crotch insert is provided at the crotch region of the pantihose.

However, the crotch inserts disclosed in UK patent
5 1268618 are seamed in position by an operative guiding a sewing machine around the periphery of the insert. This is labour intensive and relatively slow.

It is generally an aim of the present invention to provide a process and apparatus for mechanically attaching
10 a crotch insert to a garment to overlie at least a portion of the crotch region of the garment. It is also an aim of the present invention to provide a nether garment having a crotch insert attached therein by the process or apparatus according to the present invention.

15 According to one aspect of the present invention there is provided a nether garment comprising a body having a pair of leg openings defining therebetween a crotch region, and a crotch insert comprising at least one layer of material secured about its periphery to the body so as to
20 overlie at least a portion of said crotch region, the periphery of the crotch insert being secured to a folded portion formed in the body by a seam, the seam permitting the folded portion to unfold on stretch of the fabric of the body.

25 Preferably the crotch insert is secured about its periphery only to the body by means of a soft seam.

In the present specification a soft seam is a sewn seam which is relatively flexible and has a comparable

handle to that of the fabric making up the garment.

A soft seam may be provided by use of fewer stitches per unit length, production of loose stitches, and/or choice of 'soft' yarns. Examples of a soft yarn are multi-
5 filament or bulked yarns.

Preferably the or each layer of material is a fabric. The crotch insert may be made from a fabric which is the same as or different to that of the body.

According to another aspect of the present invention
10 there is provided a method of producing a nether garment comprising a body having a pair of leg openings defining therebetween a crotch region and a crotch insert overlying at least a portion of said crotch region, the method including the steps of arranging the body and crotch insert
15 such that the crotch insert overlays a portion of the crotch region, temporarily anchoring the crotch insert about its periphery to the crotch region, and subsequently securing the periphery of the crotch insert to the body.

Preferably the crotch region of the body and crotch
20 insert are held in a stretched condition prior to securance of the crotch insert to the body.

Preferably the portion of the body adjacent to the periphery of the crotch insert is formed into a fold and the periphery of the crotch insert is subsequently secured
25 to the fold.

Preferably the method includes locating the body on a support tube with the crotch region of the body extending across an open end of the tube, subsequently presenting a

layer of material for forming the crotch insert to overlies the crotch region and then temporarily anchoring the crotch region of the body and the periphery of the crotch insert together and to the tube in readiness for presentation to
5 a sewing machine for seaming the periphery of the crotch insert to the body.

Preferably the body is initially pulled in one direction along the tube in order to stretch the crotch region across the end of the tube and is subsequently moved
10 in the opposite direction to relax the fabric of the body after anchoring of the material forming the crotch insert to the crotch region at the body but prior to presentation to the sewing machine so as to create said fold.

According to another aspect of the invention there is
15 provided apparatus for performing the above method including an open ended support tube, anchoring means located adjacent the open end of the tube for anchoring the body and material to said end of the tube and gripping means for gripping the body on the outside of said tube,
20 the gripping means being movable in one direction along the tube for stretching the crotch region of the garment across the open end of the tube and being movable in the opposite direction along the tube for relaxing the fabric of the body for creating a fold in said body which projects beyond
25 the end of the tube.

Various aspects of the present invention are hereinafter described with reference to the accompanying drawings in which:-

- Figure 1 is a schematic perspective view of a nether garment according to the present invention;
- Figure 2 is a plan view of the garment shown in Figure 1
- 5 Figure 3 is a diagrammatic cross-sectional view of part of a support tube for use in inserting a crotch insert
- Figure 4 is a diagrammatic cross-sectional view similar to Figure 3 showing a garment and crotch fabric supported thereon when
- 10 presented at a sewing station
- Figure 4a is an enlarged view of the ringed area shown in Figure 4
- Figures 5a,5b schematically illustrate relative positions of the fabric of the body and crotch insert immediately after seaming and
- 15 subsequently after stretching of the fabric of the body.
- Figure 6 is a diagrammatic plan view of an apparatus shown in UK patent 2058856B.
- 20

A nether garment 10 is illustrated in Figures 1 and 2 which comprises a body 12 having a body portion 14 and a pair of depending leg portions 15. The leg portions 15 may

25 be closed at their terminal ends to define pants-hose or may be left open to form, for example breeches which terminate above or below the knee of the wearer.

If desired the leg portions 15 may be omitted or very

short leg portions 15 be provided so as to define a pair of briefs.

The body 12 has a pair of leg openings 16 which define therebetween a crotch region 18. A crotch insert 20 comprising a single layer of fabric overlies the internal face of a portion of the crotch region 18 and is preferably secured to the fabric of the body 12 by means of a single continuous seam 26. The peripheral shape of the crotch insert is either circular or elliptical.

10 The garment 10 is produced from two tubes of fabric which are cut and sewn together to define a U-seam 25. It will be noted that the crotch insert 20 overlies the portion of the U-seam passing through the crotch region 18 and so cloaks this portion of the U-seam from the wearer.

15 The size of the crotch insert 20 is preferably chosen so that it covers the majority of the crotch region 18 and preferably extends to but not beyond the periphery of the leg openings 16.

Preferably the crotch insert 20 is secured about its periphery only by the seam 26.

The seam 26 preferably comprises oversew stitches such as produced on an overlock sewing machine and the crotch insert is preferably trimmed and edged by the sewing machine simultaneously with securance to the body.

25 The seam 26 is produced so as to have a soft handle, ie a handle comparable with that of the fabrics of the crotch insert and body 12 so that the seam 26 does not appear to the wearer to be relatively stiff. The stitches

of the seam 26 may be made relatively loose, for example by the use of a loop spreader, in order to reduce the stiffness of the seam and provide a relatively flat seam.

A suitable stitch formation is stitch type 503
5 produced on a Union Special 39500 cut-lock sewing machine having a single needle 60 (Figure 4), lower looper (not shown) and upper spreader (not shown) forming a two thread stitch construction of equal proportions to allow the seam to flatten.

10 In addition or as an alternative, the yarns used for the seam 26 may be soft textured monofilament, multifilament or fibrous yarns selected for their capability in creating a soft seam and/or non-textured monofilament or multifilament yarns selected to blend in
15 with the component fabrics of the garment.

The seam 26 is preferably a single continuous circular or elliptical seam extending about the entire periphery of the crotch insert 20.

As indicated above the crotch insert 20 comprises a
20 single layer of fabric. This fabric may be the same as or different to the fabric of the body.

Thus if a single layer crotch insert 20 of the same fabric as the body 12 is chosen, a more comfortable garment than a garment without a crotch insert would result due to
25 the cloaking of the portion of U-seam passing through the crotch region.

Alternatively the crotch insert 20 may comprise multiple layers of fabric and/or other material. These

layers of fabric may be the same as or different to another and may be the same as or different to the fabric of the body.

5 The fabric for the crotch insert may be knitted, woven or non-woven. Choice of a non-woven fabric is particularly advantageous when a crotch insert having moisture absorbancy properties is required. In addition the crotch insert may be provided with a surface covering such as raised loops or pile.

10 It will be appreciated that the present invention applies to the insertion of a crotch insert into any nether garment (ie any garment intended to cover the lower torso of a wearer) and provides such a garment which is comfortable for the wearer.

15 Although the nether garment described above includes a U-seam it will be appreciated that the body 14 may be constructed in one piece so as not to have a U-seam.

A method of securing a crotch insert 20 to a body 12 is illustrated schematically in Figures 3 to 6. A pantihose is located on a support tube 70 such that the crotch region 18 is stretched across the end of the tube with the inner face of the crotch region facing outwards. Stretching is preferably achieved by moving clamps 90 axially along the tube 70 in direction A.

25 A piece of fabric 42 for forming the crotch insert 20 is subsequently presented to the end of the tube 70 to overlie the crotch region 18. The fabric 42 is preferably presented to the tube in a stretched condition. Locating

pins 74 positioned internally of the tube are extended (as shown in solid lines in Figure 3) to pass through the fabric of the crotch region and the fabric 42 and then moved radially outwards to lie against the inner surface of the tube 70 (as shown in broken lines) so as to anchor the body and crotch insert to the tube 70 in readiness for seaming.

After securance of the body and crotch fabrics on the pins, the body 12 is preferably advanced slightly by clamps 90 on the tube 70 in a direction opposite to direction A to relax the body fabric externally of the region enclosed by the pins 45 and so create a slight fold 47 which projects beyond the end of the tube 70. As seen in Figures 4,4a, the advanced position of clamps 90 is preferably located closely adjacent to the end of the tube 70 so that a minimum amount of body fabric is left unsupported between the clamp 90 and end of the tube 70. This assists control of the body fabric during sewing.

The tube 70 is now presented to a sewing head 80 (only shown in part in Figures 4,4a) such as an overlock or cup seaming machine for seaming of the fabric 42 to the fabric of body 12. This is schematically illustrated in Figures 4,4a. The sewing head 80 includes a needle plate 81 and a fabric guide 82 which are fixedly secured to one another to define a gap 83 therebetween. Typically the distance between the plate 81 and guide 82 is 5 to 7mm.

The sewing head 80 is slidably mounted in the longitudinal direction of the tube 70 for movement between

an advanced sewing position (as shown in Figures 4,4a) and a retracted non sewing position.

Preferably a lower air jet 84 and an upper air jet 85 are provided for assisting extension of the fabric 42 and
5 fold 47 into the gap 83. Preferably the jets 84 and 85 are directly opposed in the vertical direction and are positioned in the feed direction of the fabric at or closely adjacent to the needle 60.

the stitches produced by the sewing haea are
10 accurately positioned adjacent to the edge of the fold to enable the stitches to pass through both pieces of the fold and pass over the outer edges of the fold and periphery of the crotch insert. This is schematically shown in Figure 5a wherein the overlock stitches 26a are shown passing
15 through the fold 47 and peripheral fabric of crotch insert 20. As indicated above the stitches 26a are preferably loosely formed, for example by use of a spreader plate, so that on removal from the apparatus the seam may flatten out as schematically illustrated in Figure 5b when the body
20 fabric is streched.

A cutter 87 is provided for trimming the fabric 42.

During the seaming operation the tube 70 is continuously rotated and the fabric 42 is trimmed and edged to define the final peripheral shape of the crotch insert.

25 A suitable construction of support tube incorporating locating pins, and means for presenting crotch fabric in a stretched condition is disclosed in UK patent 2058856 and the disclosure thereof is incorporated herein.

In order to be capable of performing the present invention, the support tube 70, the mechanism for driving the clamp members 90 and the sewing head as disclosed in UK patent 2058856 are modified in the following manner.

5 A modified support tube 70 is illustrated in Figure 3 and differs from that disclosed in UK patent 2058856 in that the tube opening 170 across which the crotch region of the garment body is stretched projects further beyond the end of the needles or pins 74 when these are located in
10 their radially outer gripping position. Accordingly the tube 70 is provided with an axially extending extension portion 70a which is preferably of reduced thickness. In a typical example, for a tube 70 which is about 100mm diameter, the wall thickness of extension 70a is about 2mm.

15 The terminal ends of the pins 74 when in their radially outer gripping position are thereby located inboard of the terminal end opening 170 of the tube (in the example above, by a distance of about 4mm) and so enables the end of the tube to be located closely adjacent to the
20 sewing needle at the sewing head without the terminal ends of the pins 74 interfering with the sewing action of the sewing head.

Figure 6 is a reproduction of Figure 4 of UK patent 2058856 in which there is illustrated a turret 100 which
25 includes a plurality of support tubes 64 that are indexed in succession to a loading station 102, a crotch opening forming station 104, a gusset loading station 106, a seaming station 108 and an unloading station 110.

In accordance with the present invention the drive mechanism to the clamps 90 is modified so that during passage from station 102 to station 106 the clamps 90 are retracted along the support tube to stretch the fabric over
5 the end of the tube. In addition, station 104 is rendered inoperative since no cutting out of the body is required.

At station 106 the crotch insert 20 is loaded on to the pins 74 as described in UK patent 2058856 with the pins 74 passing through the crotch region of the garment.

10 After the pins 74 have been moved to their radially outer position to grip the crotch insert 20, the drive mechanism for the clamps 90 is arranged to advance the clamps 90 slightly along the tube to relax the fabric of the body and create the fold 47. Such advancement of the
15 clamps 90 occurs during passage of the tubes between stations 106 and 108.

In all other respects, operation of the present apparatus is the same as that described in UK patent 2058856.

CLAIMS

1. A nether garment comprising a body having a pair of leg openings defining therebetween a crotch region, and a crotch insert comprising at least one layer of material secured about its periphery to the body so as to overlie at least a portion of said crotch region, the periphery of the crotch insert being secured to a folded portion formed in the body by a seam, the seam permitting the folded portion to unfold on stretch of the fabric of the body.

10

2. A nether garment according to claim 1, wherein the crotch insert is secured about its periphery only to the body by means of a soft seam.

15 3. A nether garment according to claim 1 or 2, wherein the crotch insert is secured to the body by a single continuous seam extending about its entire periphery.

4. A method of producing a nether garment comprising a body having a pair of leg openings defining therebetween a crotch region and a crotch insert overlying at least a portion of said crotch region, the method including the steps of arranging the body and crotch insert such that the crotch insert overlays a portion of the crotch region temporarily anchoring the crotch insert about its periphery to the crotch region, and subsequently securing the crotch insert to the body.

20
25

5. A method according to claim 4, wherein the body is located on a support tube with the crotch region extending across an open end of the tube, subsequently presenting a layer of material for forming the crotch insert to overlie the crotch region and then temporarily anchoring the crotch region of the body and the periphery of the crotch insert together and to the tube in readiness for presentation to a sewing machine for seaming the periphery of the crotch insert to the body.

10

6. A method according to claim 5, wherein the body is initially pulled in one direction along the tube in order to stretch the crotch region across the end of the tube and is subsequently moved in the opposite direction to relax the fabric of the body after anchoring of the material to the crotch region of the body but prior to presentation to the sewing machine in order to form a fold projecting beyond the end of the support tube.

7. Apparatus for performing the method according to claims 4,5 or 6 including an open ended support tube, anchoring means located adjacent the open end of the tube for anchoring the body and material to said end of the tube and gripping means for gripping the body on the outside of said tube, the gripping means being movable in one direction along the tube for stretching the crotch region of the garment across the open end of the tube and being movable in the opposite direction along the tube for

relaxing the fabric of the body.

8. Apparatus according to claim 7, wherein the anchoring means comprises a plurality of pins located within the tube, the pins being movable to a radially outer position whereat their terminal ends reside adjacent to the inner surface of the tube, the terminal ends of said pins being located inboard of the terminal end of the tube when in said outer position.

10

9. Apparatus according to claim 8, wherein the terminal end of the tube is defined by a relatively thinly walled tube portion.

10. Apparatus according to claim 9, wherein said tube portion has a wall thickness less than about 2mm.

11. Apparatus according to claim 8, 9 or 10 wherein the terminal ends of said pins when in said outer position are spaced about 4mm from the terminal end of the tube.

20

12. A nether garment substantially as described with reference to and as illustrated in the accompanying drawings.

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13. A method of producing a nether garment substantially as described with reference to the accompanying drawings.

14. Apparatus for producing a nether garment substantially as described with reference to and as illustrated in the accompanying drawings.

- 17 -

Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

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Relevant Technical fields

(i) UK Cl (Edition L) A3V

(ii) Int Cl (Edition 5) A41B (9/02,9/04,9/08,11/14_;
A41D (27/24)

Databases (see over)

(i) UK Patent Office

(ii)

Search Examiner

D BUCKLEY

Date of Search

19 APRIL 1993

Documents considered relevant following a search in respect of claims 1 TO 3 AND 12

| Category (see over) | Identity of document and relevant passages | Relevant to claim(s) |
|------------------------|--|-------------------------|
| A | GB 2040157 A (SOLIS srl) - see folded crotch portion between elements 2 and 11 | |
| A | GB 2029195 A (SOLIS srl) - see sentence bridging pages 1 and 2 | |

| Category | Identity of document and relevant passages | Relevant to claim(s) |
|----------|--|----------------------|
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X: Document indicating lack of novelty or of inventive step.

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